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MARINE CORPS ORDER 4490.1

From: Commandant of the Marine Corps
To: Distribution List

Subj: GROUND CLASS VII MATERIEL REQUIREMENTS DETERMINATION; APPROVED
ACQUISITION OBJECTIVE (AAO)

Ref: (a) DoDDir 5000.1
(b) DoDRegulation 5000.2-R
(c) SECNAVINST 5000.2B
(d) MCO P3900.15
(e) DoDReg 4140.1-R
(f) MCO P4400.172

Encl: (1) Depot Maintenance Float Allowance Determination Model
(2) War Reserve Materiel Requirement Determination Model
(3) Definitions

1. Purpose. To publish policy for the determination of materiel requirements for ground class VII (principal end item) T/E allowance items. The provisions of this Order are intended to influence and defend Marine Corps programming and budgeting decisions.

2. Information. Enclosure (1) describes the methodology for calculating the Depot Maintenance Float Allowance (DMFA). Enclosure (2) describes the methodology for calculating the War Reserve Materiel Requirement (WRMR). The definitions in enclosure (3) are included to clarify the text and to provide general information on logistics terms.

3. Background

a. Since 1985, the Department of Defense (DoD) has been involved in efforts to streamline the process for requirements determination and materiel acquisition. In 1996, DoD directives in the 5000 series (references (a) and (b)), were published to separate mandatory policies and procedures from discretionary practices. The DoD 5000 series provides guidelines to more closely link the functions of requirement determination and materiel acquisition. Reference (c) amplifies the guidance in references (a) and (b) and identifies specific Department of the Navy requirements. Per reference (d), the Marine Corps has established the Combat Development Process (CDP) for all its requirements categories, including materiel requirements. The process used to develop doctrine, organization, training and

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education, and facilities and support requirements is modeled after the process mandated by the DoD 5000 series of directives for equipment acquisition.

b. The Commanding General, Marine Corps Combat Development Command (CG MCCDC) is responsible for the implementation, execution, and management of the CDP. The CDP is an integrated process that is based on operational and functional concepts of formulating warfighting requirements, implementing efficient and effective programs, and establishing operational capabilities in support of Marine Air-Ground Task Forces (MAGTF). The CDP includes the continuous examination and evaluation of Marine Corps combat capabilities and concepts to identify deficiencies and develop new concepts and required capabilities.

c. The CDP, as described in reference (d), consolidates diverse functions into a single integrated "cradle to grave" process. It not only identifies requirements and develops capabilities, but also provides support for the capabilities once obtained. The process provides the methodology to evaluate options for rectifying deficiencies and improved business practices to select those with the greatest return on investment.

d. One of the functions within the CDP is requirements determination. Requirements determination combines analytical skills and military judgment to determine the most efficient and effective manner to rectify deficiencies identified in any of five requirements categories: doctrine, organization, training and education, equipment and facilities, and support. These deficiencies are formally analyzed by CG MCCDC and assessed against the future environment. Nonmateriel solutions are considered first and are preferred. However, when a nonmateriel solution cannot be found, a materiel solution is developed; the CG MCCDC will initiate mission need statements (MNS) and operational requirements documents (ORD) per reference (e).

4. Scope. The following policy shall be used to determine the quantities of materiel and equipment which comprise applicable ground materiel requirements for new items of equipment which are determined through ORD's per references (a) and (b), and for materiel registered in the Logistics Management Information System (LMIS) which includes class VII (principal end item) T/E allowance items.

5. Discussion. Acquisition objective determination is conducted by the CG MCCDC, with assistance from the Deputy Chief of Staff for Installations and Logistics (DC/S I&L); Commander, Marine Corps Systems Command (COMMACORSYSCOM); and Commander, Marine Corps Logistics Bases (COMMACORLOGBASES).

6. Approved Acquisition Objective (AAO)

a. Reference (e) defines the AAO and provides policy for computing requirements. Within the Marine Corps, the AAO is the quantity of an item authorized for peacetime and wartime requirements to equip and sustain the Marine Corps per current DoD policies and plans. The AAO is the sum of the following requirements:

AAO = Initial issue (for new equipment) or table of equipment allowances (for equipment in production/fielding) for Marine Force (MARFOR) units, the Supporting Establishment (SE)

- + Maritime Prepositioning Ships (MPS) allowances, which does not include fly-in-echelon (FIE), nor low density (LD) equipment
- + Norway Air-Landed Marine Expeditionary Brigade (NALMEB) allowances
- + Depot Maintenance Float Allowances
- + WRMR (less MPS allowances) or zero (to prevent a negative allowance when the MPS quantities are greater than or equal to the WRMR).

b. Materiel procurement is subject to fiscal constraints. In any year, only a portion of the total materiel requirement (AAO) for an item, may actually be funded based upon program objectives memorandum (POM) guidance. The reduced acquisition quantities (programming objectives), while not reducing the AAO, may be recommended based on the need to balance risk, capability, and affordability.

c. The components of materiel requirements determination are explained below:

(1) Initial Issue. Initial issue requirements are developed by CG MCCDC based on force structure, doctrine, concept of employment, and objective training standards.

(a) Active Component. Equipment requirements for active forces include T/E allowances for FMF units, grouped by the Marine Expeditionary Forces (MEF) (i.e., I MEF, II MEF, III MEF) and those units designated as "special missions" within LMIS (i.e., battalions that support two MEF's under the cognizance of the Marine force commander).

(b) Reserve Component. Equipment requirements for the MARFOR Reserve (MARFORRES) are reflected in the organizational T/E's (which include both in-stores initial issue and training allowances (T/A)).

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(c) Supporting Establishment. The supporting establishment consists of remaining non-FMF units which include: Marine Corps bases, posts, and stations; formal schools and academies; Marine Corps Security Forces; and non-FMF commands.

(2) Maritime Prepositioning Ships (MPS). The MPS is divided into three maritime prepositioning squadrons. Each is configured with selected items of equipment and ammunition to sustain a MAGTF in combat for 30 days when augmented by the FIE. CG MCCDC determines MPS equipment allowances. MPS allowances, although not considered "operationally" as war reserve materiel (WRM), shall nonetheless be counted against the WRMR for acquisition purposes.

(3) Norway Air-Landed Marine Expeditionary Brigade (NALMEB). The NALMEB includes selected items of equipment prepositioned for training and MAGTF contingency use. CG MCCDC determines NALMEB equipment allowances. NALMEB allowances will not be counted against the WRMR.

(4) Depot Maintenance Float Allowance (DMFA)

(a) The mission of DMFA is to provide a quantity of mission-essential, maintenance significant equipment to permit the withdrawal of equipment from organizations for scheduled repair (performed at the depot level) without detracting from a unit's readiness condition. The allowance for these assets is based on the expected life of the equipment, evolving technology, and the anticipated washouts over the equipment's lifecycle. The stores system is responsible for the timely rotation of equipment for depot level scheduled maintenance (overhaul, repair and evacuation (R and E), repair and return (R and R), inspect and repair only as necessary (IROAN), etc.).

(b) For all equipment, to include "new", in production, and fielded equipment, COMMARCORLOGBASES will use the DMFA formula provided in enclosure (1) to compute DMFA numbers. After the DMFA is computed, CG MCCDC validates that the DMFA supports the warfighting capabilities and approves the allowance.

(5) War Reserve Materiel Requirement (WRMR)

(a) WRMR. The WRMR is computed based on a combat active replacement factor (CARF) that considers probabilities of combat loss over a specified number of days in various combat scenarios (i.e., armored or infantry, assault or sustained operations), as stipulated in the Defense Planning Guidance. Inventories of equipment prepositioned on MPS are used to offset the overall WRMR for specific items. The WRMR formula is explained in enclosure (2). CG MCCDC determines the WRMR's for all equipment allowances in LMIS.

(b) Maritime Prepositioning Ships (MPS). The MPS allowances (which do not include FIE and LD equipment allowances), although not to be considered operationally as WRM, shall nonetheless be counted against the WRMR for acquisition purposes. When the WRMR quantity exceeds the MPS quantities, only the difference will be procured. In situations where the MPS allowances are greater than WRMR, the WRMR acquisition quantity is zero.

7. Responsibilities

a. Deputy Chief of Staff for Installations and Logistics (DC/S I&L)

(1) Coordinate and approve changes in methodology for determining WRMR and DMFA requirements.

(2) Inform CG MCCDC, COMMARCORSYSCOM, and COMMARCORLOGBASES on DoD, Department of the Navy (DON), and Marine Corps policy changes that affect WRMR/DMFA computations for possible adjustments to AAO's.

b. Deputy Chief of Staff for Programs and Resources (DC/S P&R)

(1) Perform programmatic analysis of all AAO's to ensure compliance with CMC and DoD guidance, per reference (b).

(2) Provide CG MCCDC milestones for the AAO submission.

(3) Forward recommended programming objectives (reduced acquisition levels) as required to balance risk and the attainment of required capabilities within the fiscal constraints of the POM.

c. Commanding General, Marine Corps Combat Development Command (CG MCCDC)

(1) Determine materiel requirements and prepare the AAO for each new T/E equipment item for staffing prior to approval by the CMC/ACMC.

(2) Provide AAO's for all equipment to CMC (P&R) and COMMARCORSYSCOM prior to preparation of POM acquisition initiatives as directed.

(3) Review, validate, and approve requests for modifications of allowances to the T/E's per reference (f).

(4) Revalidate the AAO every 2 years to reflect T/E changes, and capture operational usage data following the attainment of initial operational capability (IOC).

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(5) Develop and maintain the combat attrition model used to establish the individual CARF rates, to determine the WRMR's for equipment items.

(6) Compute and determine the WRMR's for class VII equipment items.

(7) Determine Initial Issue, MPF, NALMEB, and WRMR quantities for all items of equipment in LMIS. Provide data to CMC (I&L), COMMARCORSYSCOM, and COMMARCORLOGBASES.

(8) Coordinate with COMMARCORLOGBASES to determine DMFA for all items in LMIS. Provide data to CMC (I&L), COMMARCORSYSCOM, and COMMARCORLOGBASES.

(9) Oversee the troop list file (TLF) and equipment allowance file (EAF), within LMIS, to correctly reflect up-to-date initial issue, DMFA, and sustainment numbers for T/E items of equipment.

d. Commander, Marine Corps Systems Command (COMMARCORSYSCOM)

(1) Use CG MCCDC validated AAO's for equipment items for development of POM acquisition initiatives.

(2) Participate in and support the development of AAO's, to include determining an appropriate equipment overhaul cycle.

e. Commander, Marine Corps Logistics Bases (COMMARCORLOGBASES)

(1) Compute the DMFA for all items of equipment, both fielded items and new acquisition items under procurement, with the assistance of COMMARCORSYSCOM.

(2) Provide the DMFA data to CG MCCDC and COMMARCORSYSCOM.


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DEPOT MAINTENANCE FLOAT ALLOWANCE DETERMINATION MODEL

1. Purpose. Describe the methodology used in calculating the DMFA.
2. Background. The mission of DMFA is to provide a quantity of mission-essential, maintenance significant equipment to permit the withdrawal of equipment from organizations for scheduled repair (performed at the depot level) without detracting from a unit's readiness condition. This methodology ensures that a sufficient quantity of replacement items are on-hand to meet operational readiness requirements.
3. Methodology. The formula for computing the DMFA is depicted below.

$$DMF \text{ ALLOWANCE} = (ITEM \text{ DENSITY} \times DMF \text{ FACTOR}) + WQ$$

- a. The three main elements from the equation above are:

- (1) Item Density: density of the item throughout the Marine Corps,
- (2) DMF Factor: the expected percentage of time the item will not be available to the unit, and
- (3) WQ: the expected wash-out quantity of the item over its life cycle.

- b. Item Density

(1) The density of each item is the driving factor in determining an appropriate DMF allowance. Therefore, the item densities will be continually reviewed to ensure that allowances are being computed correctly. The total end-item density (total density) is the total requirement for items in the entire Marine Corps inventory. For computation of DMFA, the "item density" will exclude levels maintained as WRMR (less MPF allowance), Reserve "in-stores," and those prepositioned in Norway (NALMEB). The formula used for item density is:

$$Item \text{ Density} = Initial \text{ Issue} + MPF - Reserve \text{ "in-stores"}$$

(2) Since most of WRMR, Reserve in-stores, and NALMEB items remain in storage for extended periods of time, they experience minimal usage and are not inducted into the depots for repairs in the same manner as items in the active and Reserve forces. Although these items eventually rotate into MARFOR units, including them in the density level tends to overstate the DMFA requirement.

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c. DMF Factor. This factor represents the percentage of time an end item is not available to an operational unit due to required depot level maintenance. The DMF factor is a percentage of the total time required to complete the repair cycle which includes: transportation time, administrative time, actual repair time, and time between scheduled overhaul. The DMF factor equation is depicted as:

$$\text{DMF FACTOR} = \text{MRCT} / (\text{MTBO} + \text{MRCT})$$

where:

MRCT = mean repair cycle time to complete 5th echelon repair and return to condition code "A"

MTBO = mean time between scheduled overhaul

(1) Mean Repair Cycle Time (MRCT). The MRCT is the time to complete 5th echelon repair at our depot, another service depot or commercial facility, to include the administrative time (tracked from disposition to receipt at the appropriate regional support activity (RSA) less the actual transportation time), the transportation time (differentiated by CONUS/OCONUS), and the actual repair times as depicted in the following equation.

$$\text{MRCT} = \text{Admin} + \text{Trans} + \text{Repair}$$

(a) Administrative. The admin time is tracked for equipment based on when the originating message for disposition instructions are issued from COMMARCORLOGBASES until the item is receipted for at the RSA, discounting actual transportation time.

Note: Although not used for determining DMFA, "awaiting induction time" is tracked and is defined as the time from receipt of the equipment at the RSA until inducted into the depot repair cycle as condition code "M". The tracking provides visibility over shifting priorities and/or unfunded requirements.

(b) Transportation. The transportation times are computed using a weighted average of the transportation time for end items located within CONUS and to/from OCONUS. The transportation time equation is:

$$\text{Trans} = (\text{Trans}_{\text{OCONUS}} \times \frac{\text{III MEF Density}}{\text{ITEM Density}}) + (\text{Trans}_{\text{CONUS}} \times \frac{\text{ITEM Density} - \text{III MEF Density}}{\text{ITEM Density}})$$

where:

TRANSCONUS: average CONUS transportation time

TRANSOCONUS: average to/from OCONUS transportation time

ENCLOSURE (1)

(c) Repair Time. The repair time is the time to return an item from a condition code "M" status (inducted into the master work schedule) to a condition code "A" status (ready for issue).

(2) Mean Time Between Schedule Overhaul (MTBO). The MTBO is the mean time between scheduled maintenance at the depot (i.e., overhaul, R&R, IROAN, etc.). For new equipment the time factor is determined based on the engineering studies, the anticipated life cycle, and historical usage data for similar equipment.

d. Wash-Out Quantity (WQ). During an item's life cycle, they are sometimes damaged beyond repair. If additional items cannot be procured, items from the DMF are issued to using units to fill T/E deficiencies. However, as this occurs the available pool of assets in the DMF is continually reduced, degrading the DMF's ability to support the MARFOR's and supporting establishments. The WQ is based from historical information to estimate the number of peacetime losses over the projected life cycle of item.

4. Special Considerations. CG MCCDC with the concurrence of COMMARCORSYSCOM and COMMARCORLOGBASES, may suspend the afore- mentioned formula due to unique conditions. Examples that are included in this category are low density (LD), short life cycle (SLC), commercial off-the-shelf (COTS), nondevelopmental items (NDI), and new items without historical information.

a. Low Density (LD) Items. LD items are a set of items requiring special management attention due to extremely low density, potential complexity or high operational availability requirements. Due to the low densities of these important items, the DMF allowance formula may produce inordinately low allowance levels (i.e., 1 or 2) which may not be sufficient to support the FMF. Therefore, for items specifically identified as LD, CG MCCDC with the assistance of COMMARCORLOGBASES is authorized to suspend the use of the preceding DMFA formula and determine the DMFA based on usage data and valid external support requirements.

b. Short Life Cycle (SLC). This addresses those items that have a 5-year or less obsolescence from initial fielding, in which acquisition lead times and delivery schedules may make the procurement of all or some of the requirement uneconomical. The use of COTS and NDI, in conjunction with smart business practices will reduce inventories, and normally eliminates the DMFA requirement.

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c. Items for Which No Scheduled Maintenance Cycle Exists In instances where items are repaired as required and no specific maintenance cycle exists, available historical data can be utilized to determine the appropriate DMFA. The required elements of information are the MRCT for the item, the average number of repairs performed each year, and the estimated maximum number that can reasonably be expected in a given year. Given this information, statistical queuing techniques can be utilized to determine the proper allowance.

d. New Items. Since historical information will not be available for new items, the MTBO and the MRCT must be estimated. During the logistics support analysis (LSA) for new items, estimates for both of these factors may be available. In the absence of a complete LSA, an estimate should be derived from the reliability, availability, and maintainability factors obtained from the requirements documentation, and if available, the equipment specification, government or commercial. These initial estimates should be revised after the item has been fielded and historical information becomes available.

e. Consistent Units of Measure. Various Marine Corps equipment operating time codes (EOTC's) exist for different items of equipment, such as: miles traveled, rounds fired, days and hours of operation. The establishment of depot level work time is based on the type of equipment and time between service. Prior to calculating an MTBO for any item, a conversion process is necessary to provide a standard overhaul period (i.e., days, months or years) based on the lifecycle of the equipment.

f. Excessive Equipment Repair Cycle Times. Historically, items have often experienced extremely long repair cycle times due to a variety of reasons. In order to avoid artificially inflating the DMFA, both the administrative and transportation time portion of the MRCT variable will account for the actual times, but are limited for DMFA calculations to a maximum of 30 days each.

ENCLOSURE (1)

WAR RESERVE MATERIEL REQUIREMENT (WRMR) DETERMINATION MODEL

1. Purpose. Describe the methodology used in calculating the WRMR.
2. Background. The number of days of sustainment in the WRMR, the authorized end-strength, the period of time, and the level of intensity for which each MEF should plan changes from time to time. This war requirement is developed from the defense planning guidance (DPG) and its illustrative planning scenarios (IPS). Specific guidance regarding these factors is provided by the CMC (LPO) on an as-required basis, due to changes in scenarios or a new DPG. Other items such as LD and SLC items may result in reductions to the WRMR for certain end items. This enclosure uses the FY 1998-2003 DPG's developed requirements of "90 days" to illustrate the WRMR computation.
3. Methodology
 - a. CG MCCDC develops a CARF for each item that is combat essential. A CARF is represented by various rates (i.e., assault or sustained) based on the scenario driven threat (i.e., armored or infantry).
 - b. As part of the war reserve computation, the determination of scenario forces, timelines, and other relevant factors will be validated by the Marine Corps Scenario Working Group (WCSWG). The MCSWG will ensure compliance with the DPG IPS and provide consistency with assumptions in other scenario-based models.
 - c. The WRMR is computed by multiplying the appropriate CARF by the T/E quantity of equipment in each MEF, then adding the results for each MEF. The WRMR formula used to compute the WRMR for 90 days in this particular example (30 days assault/60 days sustained) of sustainment is:

$$\begin{aligned} \text{WRMR} = & (\text{II MEF} + \text{IV MEF}) \quad \times \quad \text{ARMORED ASSAULT CARF} \\ & (\text{represents 30 days}) \\ & + (\text{I MEF} + \text{III MEF}) \quad \times \quad \text{INFANTRY ASSAULT CARF} \\ & (\text{represents 30 days}) \\ & + [2 \times (\text{II MEF} + \text{IV MEF})] \times \text{ARMORED SUSTAINED CARF} \\ & (\text{represents 60 days}) \\ & + [2 \times (\text{I MEF} + \text{III MEF})] \times \text{INFANTRY SUSTAINED CARF} \\ & (\text{represents 60 days}) \end{aligned}$$

ENCLOSURE (2)

DEFINITIONS

Approved Acquisition Objective (AAO). The quantity of an item authorized for peacetime and wartime requirements to equip and sustain U.S. and Allied Forces in accordance with current DoD policies and plans. This quantity shall be sufficient to support other U.S. Government agencies as appropriate. (DoD 4140.1-R)

Combat Active Replacement Factor (CARF). The estimated equipment attrition rate of a particular combat essential item. The factor is developed in 30-day increments and based on a particular scenario. Examples of the scenarios can include an armored or infantry threat, using an assault or sustained rate of operational requirements. CARF's are used to calculate necessary quantities of items for war reserve.

Maritime Prepositioning Force (MPF). A naval force comprised of MPS, a MAGTF, and a Naval Support Element (NSE), under a common commander, Commander, Maritime Prepositioning Force for the duration of the MPF deployment operation. (MCO P3000.17).

Maritime Prepositioning Ships (MPS). One or more of the civilian owned and operated ships, loaded with prepositioned Marine Corps and Navy combat equipment and supplies. MPS is organized into squadrons of four or five ships. (MCO P3000.17).

Short Life Cycle (SLC) Items. Those items that due to rapidly changing technology have a 5-year or less obsolescence from initial fielding. These items encourage the use of COTS and NDI to optimize business opportunities and reduce inventories.

War Materiel Requirement (WMR). The quantity of an item required to equip and support the approved forces specified in the current Secretary of Defense guidance through the period prescribed for war materiel planning purposes (JCS Pub 1-02). The WMR is the total requirement, to include sustainment which is referred to in this Order as the AAO.

War Reserve Materiel (WRM). Mission-essential secondary items, principal end items, and munitions required to attain operational objectives in the scenarios authorized for sustainability planning in the DPG (DoDDir 3110.6). The WRM represents that portion of the AAO required for sustainment, consisting of the WRMR and that equipment set aside in NALMEB.

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War Reserve Materiel Requirement (WRMR). The portion of the WMR required to be on-hand on D-day. This level consists of the WMR less the sum of the peacetime assets assumed to be available on D-day and the war materiel procurement capability (JCS Pub 1-02). For computation of DMFA, the "item density" will exclude levels maintained as WRMR (less MPF allowance), Reserve "in-stores," and those prepositioned in Norway (NALMEB).

War Reserve Residual Materiel (WRRM). The amount of materiel required to reconstitute prepositioned stocks (i.e., MPS) immediately following conclusion of an action that executes the CARF requirement (i.e., following a war, what materiel is required to regenerate MPS for a contingency).

ENCLOSURE (3)